DETACHABLE FLEXIBLE AND EXPANDABLE DISPLAY WITH TOUCH SENSOR APPARATUS AND METHOD

BACKGROUND

[0001] The invention relates generally to the field of display systems for portable electronic devices. In particular, the invention relates to display systems for portable electronic devices that include touch sensors for providing input to the portable electronic devices and where the display systems are detachable from the portable electronic devices. Further, the invention relates to detachable flexible and/or expandable displays for portable electronic systems, each flexible and/or expandable display having associated therewith a touch sensing device.

[0002] Conventionally, portable electronic devices include visible displays, such as liquid crystal displays (LCD's) and other similar displays. Such displays may be incorporated into any of a variety of portable electronic devices, such as mobile telephones, handheld computers, personal digital assistants (PDA's), laptop computers, and the like. Because it is desirable for a portable electronic device to have a relatively small form factor, it has been generally undesirable to include a large display screen. Accordingly, conventional electronic devices include displays which have a relatively small form factor and are generally smaller than the footprint of the portable electronic device itself.

[0003] Because of the small form factor, many conventional portable electronic devices also include a touch sensor which may be overlaid, underlaid, or incorporated into the display screen itself. The touch sensor is provided to enable users to provide input to the portable electronic device.

[0004] Because displays for portable electronic devices are relatively small, a number of disadvantages arise in using such devices, such as, but not limited to difficulty in reading text on the screen, difficulty in displaying pictorial or graphic images, difficulty in navigating around the screen because large amounts of scrolling may be required, difficulty in editing and formatting documents, and difficulty in displaying large amounts of information.

[0005] Accordingly, there is a need for a display system that maintains a relatively small form factor but is expandable and also maintains a touch sensor associated with and movable with the expandable display. There is also a need for a portable electronic device which includes a flexible and/or expandable display that may be detachable from the body of the device and contains a touch sensor which is movable with the flexible and/or expandable display and provides an enlarged touch sensor area when the viewing area of the flexible and/or expandable display screen is enlarged. Further, there is a need for a foldable display assembly. The portable display assembly may include a foldable electronic display surface with a touch sensor that is foldable with the foldable electronic display surface. Further still, there is a need for a handheld computer with an expandable display assembly that includes a touch sensor that is enlarged when the expandable display assembly is enlarged. The handheld computer may include a connector such that the expandable display assembly may be removed from the handheld computer while remaining in communication therewith.

[0006] It would be desirable to provide a system and/or method that provides one or more of these or other advantageous features. Other features and advantages will be made apparent from the present specification. The teachings disclosed extend to those embodiments which fall within the scope of the appended claims, regardless of whether they accomplish one or more of the aforementioned needs.

SUMMARY

[0007] An exemplary embodiment relates to a display system. The display system is detachable from a host device. The display system includes a power source. The display system also includes a processor coupled to the power source and a memory coupled to the power source and the processor. The display system further includes a flexible electronic display coupled to the processor and the power source and a coupler for coupling the flexible electronic display to the host device. Further still, the display system includes a flexible touch sensor movable with the flexible electronic display.

[0008] Another exemplary embodiment relates to a portable electronic device. The portable electronic device includes a housing and a coupler connected to the housing. The portable electronic device also includes a flexible display screen assembly. The flexible display screen assembly is viewable when coupled to the coupler and expandable to provide a larger viewing area, at least when decoupled from the coupler. The flexible display screen assembly further includes a power source, a processor coupled to the power source, a memory coupled to the power source and the processor, and a flexible electronic display coupled to the processor and the power source. The flexible display screen assembly further includes a flexible touch sensor movable with the flexible electronic display, providing an enlarged touch sensor area when the viewing area of the flexible display screen assembly is enlarged.

[0009] Yet another exemplary embodiment relates to a foldable display assembly. The foldable display assembly includes a power source and a processor coupled to the power source. The foldable display assembly also includes a memory coupled to the power source and a foldable electronic display coupled to the processor and the power source. The foldable display assembly further includes a coupler for coupling the foldable electronic display to a host device, and a foldable touch sensor foldable with the foldable electronic display.

[0010] Yet further still, an exemplary embodiment relates to a handheld computer. The handheld computer includes a housing and an expandable display assembly supported on the housing. The expandable display assembly provides a viewing area when folded and provides a larger viewing area when expanded. The handheld computer further includes a touch sensor associated with the expandable display. The touch sensor is enlarged when the expandable display is expanded.

[0011] Yet further still, another exemplary embodiment relates to a method of using a handheld computer. The method includes viewing an image on an unenlarged viewing area of a flexible display. The method also includes providing input to the handheld computer via a touch sensor having an unenlarged sensing area associated with the flexible display. Further, the method includes enlarging the